

## Aquatic Invertebrate Community Structure in Broadleaf Marshes

Expectation:	An aquatic macroinvertebrate community within remnant broadleaf marsh and restored broadleaf marsh in areas that exist as pasture, exhibiting species richness $> 125$ , species diversity $\geq 3.0$ , and community evenness $\geq 0.60$ within three years following hydrologic restoration.
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Relevant Endpoint(s):	Restoration - Biological Integrity - Community Structure Restoration – Biological Integrity – Biodiversity Restoration – System Functional Integrity - Habitat Quality Restoration – System Functional Integrity - Habitat Use
Baseline Conditions:	<p>Quarterly, replicate (3) aquatic invertebrate samples were collected from broadleaf marsh habitats in Pools A and C from August 1995 – May 1997. Broadleaf marsh habitats in Pool A were dry during most of this period, and were sampled only once during the two-year study. Species richness (22), diversity (0.81), and evenness (0.26) were very low, reflecting poor quality (dry) habitat during most of the period. Mean annual density of macroinvertebrates was 849.9 individuals/m<sup>2</sup>. Broadleaf marsh habitats within Pool C were sampled three times between August 1995 and May 1997. Species richness (65), diversity (2.6), and evenness (0.62) were much greater than in Pool A, although low compared to natural wetland systems of central Florida. Within Pool C broadleaf marsh, mean annual density of macroinvertebrates was 4727.3 individuals/m<sup>2</sup>.</p> <p>Pasture habitats in Pools A and C were dry throughout most of the two-year study, and were not sampled.</p>
Reference Conditions:	<p>Although historic data on aquatic invertebrate community structure of broadleaf marsh habitats within the Kissimmee River ecosystem are not available, reference conditions have been derived from current literature on tropical, subtropical, and temperate river-floodplain and wetland ecosystems (Kushlan 1975; Kushlan and Kushlan 1980; Toth 1993; Mallory et al. 1994; Rader 1994; Rader and Richardson 1994; Jordan et al. 1996a, 1996b; Merritt et al 1996; Evans et al. 1999; Rader 1999). In most wetland systems, chironomids and oligochaetes are numerically dominant, often accounting for <math>&gt; 50\%</math> of mean annual numbers. Rader (1994) found 174 taxa comprise the known aquatic macroinvertebrate community in the Everglades, but indicates that the actual number of taxa may exceed 200 – 250 species. Diversity estimates for benthic macroinvertebrates in natural flatwoods marshes range from 3.94 to 4.50, with a mean of 4.23 (Evans et al. 1999). Expectations for aquatic macroinvertebrate species richness (<math>&gt;125</math>), species diversity (<math>\geq 3.0</math>), and community evenness (<math>\geq 0.60</math>) within restored broadleaf marsh habitats, and restored broadleaf marsh in areas that exist as pasture, represent conservative estimates derived from these reference conditions. Table 1 lists taxa typical of central and southern Florida marshes that can serve as indicators of broadleaf marsh restoration.</p>

Mechanism Relating Restoration  
To Reference Conditions:

Re-established hydroperiods and variable depth patterns within existing broadleaf marshes and newly created marshes, associated development of a diverse, heterogeneous wetland plant community, and re-establishment of predator-prey interactions, likely will shape and maintain a diverse macroinvertebrate community characteristic of the pre-channelized condition.

Time Course for Restoration:

The time frame for re-establishing a diverse aquatic invertebrate community within newly created wetlands is primarily dependent on the rate at which floodplain habitats are re-inundated, the duration of inundation, depth of inundation, and how fast the mosaic of wetland plant species become re-established. Reestablishing a diverse aquatic community in existing marshes is primarily related to reestablishment of historic hydroperiods.

Implementation of the interim upper basin regulation schedule (November 2001) is expected to seasonally inundate portions of the floodplain in Pool C. Invertebrate response likely will be rapid, with mobile taxa, primarily coleopterans, dipterans, ephemeropterans, hemipterans, and odonates colonizing within one month. During the first hydrologic cycle, it is expected that a wetland plant community will become reestablished. During this time, crustaceans (amphipods, isopods, crayfish, and freshwater shrimp), gastropods, and mollusks likely will colonize. Invertebrate distributions and diversity will be a function of hydrologic patterns, interspecific competition, and predator-prey interactions. It is likely that macroinvertebrate community structure will achieve the stated expectation 3-5 years following reestablishment of historic hydroperiods. However, any delay in reestablishing historic hydroperiods likely will delay the reestablishment of historic aquatic invertebrate community structure characteristics.

Adjustments for External  
Constraints:

None: Because all taxa likely to re-colonize restored broadleaf marsh habitats occur within the Kissimmee-Okeechobee ecosystem, there are no external constraints which would delay or preclude restoration of this biotic component.

Means of Evaluation:

Initial sampling of existing broadleaf marsh habitat will coincide with sampling of large-bodied fish and wading bird utilization of floodplain habitats (i.e., within one month of initial floodplain inundation). Although this time frame is not sufficient to reestablish historic aquatic invertebrate community structure characteristics, data may be useful in explaining the initial response and distribution of large-bodied fishes and wading birds within floodplain habitats. Sampling of newly created marsh will commence approximately 12 months following inundation, if this time period is sufficient to promote growth of broadleaf marsh vegetation. Methods will be identical to those outlined in Anderson et al. (1998), and include quarterly (at a minimum), replicate (5, minimally) "stovepipe" (area = 0.105 m<sup>2</sup>) samples from randomly selected locations within Pools A and C broadleaf marshes and pasture habitats undergoing transition to broadleaf marsh. Samples will be analyzed for species identity, species richness, species diversity,

and community evenness. Results will be compared to the stated expectation.

## REFERENCES

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Table 1: Common central and southern Florida wetland macroinvertebrate taxa.

Taxa

Crustacea:

Amphipoda:

*Hyalella azteca*

*Crangonyx floridana*

Isopoda:

Asellidae:

*Caecidotea* spp.

Annelida:

Oligochaeta

Decapoda:

*Palaemonetes paludosus*

*Procambarus* spp.

Insecta:

Coleoptera:

Dytiscidae:

*Bidessontus* spp.

*Celina* spp.

*Copelatus* spp.

*Coptotomus* spp.

*Cybister* spp.

*Dytiscus* spp.

*Hydroporus* spp.

*Laccodytes* spp.

*Laccophilus* spp.

*Laccornis* spp.

*Pachydus* spp.

*Uvarus* spp.

Hydrophilidae:

*Berosus* spp.

*Derallus* spp.

*Enochrus* spp.

*Helobata* spp.

*Heloporus* spp.

*Hydrobiomorpha* spp.

*Hydrobius* spp.

*Hydrochus* spp.

*Hydrophilus* spp.

*Tropisternus* spp.

Noteridae:

*Hydrocanthus* sp.

*Suphis* sp.

*Suphisellus* sp.

Diptera:

Ceratopogonidae:

*Dasyhelea* spp.

Culicidae:

*Uranotaenia* spp.

*Mansonia* spp.

Tabanidae:

*Tabanus* spp.

Tipulidae:

*Limonia* sp.

Chironomidae:

*Ablabesmyia* spp.

*Chironomus* spp.

*Glyptotendipes* spp.

*Goeldichironomus* spp.

*Labrundinea* spp.

*Larsia* spp.

*Monopelopia* spp.

*Natarsia* spp.

*Polypedilum* spp.

*Tanytarsus* spp.

Stratiomyidae:

*Odontomyia* spp.

Ephemeroptera:

Baetidae:

*Callibaetis floridanus*

Caenidae:

*Caenis diminuta*

Hemiptera:

Belostomatidae:

*Abedus* spp.

*Belostoma* spp.

*Lethocerus americanus*

Corixidae:

*Trichocorixa* spp.

Hydrometridae:

*Hydrometra* spp.

Mesoveliidae:

*Mesovelia* spp.

Naucoridae:

*Pelocoris* spp.

Pleidae:

*Paraplea* spp.

Lepidoptera:

Noctuidae:

*Simyra* spp.

Pyrilidae:

*Acentria* spp.

*Parapoynx* spp.

Odonata:

Anisoptera:

Aeschnidae:

*Anax junius*

*Coryphaeschna* spp.

Libellulidae:

*Erythemis simplicicollis*

*Libellula* spp.

*Pachydiplax longipennis*

*Tramea* spp.

Zygoptera:

Coenagrionidae:

*Enallagma* spp.

*Ischnura* spp.

Trichoptera:

Hydroptilidae:

*Oxyethira* spp.

Leptoceridae:

*Nectopsyche* spp.

Gastropoda:

Anycilidae:

*Ferissia* spp.

Planorbidae:

*Pomacea paludosus*

Helisomidae:

*Helisoma* spp.

Physidae:

*Physella* spp.

